

$$\Delta E = -q_w'' A \Delta t$$

$$m c_p \Delta T = -q_w'' A \Delta t$$

$$m c_p \frac{\Delta T}{\Delta t} = -q_w'' \cdot A \quad ; \quad \Delta t \rightarrow 0$$

$$m c_p \frac{dT}{dt} = -q_w'' \cdot A \quad ; \quad m = \rho V = \rho \frac{4}{3} \pi R^3 \quad \text{e} \quad A = 4\pi R^2$$

$$\rho \frac{4}{3} \pi R^3 c_p \frac{dT}{dt} = -q_w'' 4\pi R^2$$

$$\rho c_p R \frac{dT}{dt} = -q_w'' \quad ; \quad q_w'' = h(T - T_m)$$

$$\rho c_p R \frac{dT}{dt} = -h(T - T_m)$$

$$\frac{dT}{dt} = -\frac{3h}{\rho c_p R} (T - T_m) \quad ; \quad T(0) = T_m$$